Leidy, Robert

From:	Leidy, Robert
Sent:	Monday, August 25, 2014 9:38 AM
To:	Simms, Jeffrey; Ben Lomeli; Marcia Radke
Cc:	Daniel Moore
Subject:	RE: Rosemont hydro call re: PHABSIM

Hi Jeff,

I am most familiar with the IFIM approach and do not see why it couldn't be used in this situation. I agree that some sort of hydraulic modeling approach would be very useful. This said, it might be worthwhile to talk to someone at the USGS research center in Fort Collins (link below) where they do this sort of work. I am not sure whether Ken Bovee is still around but he, or others, could provide insights into various modeling approaches.

One additional thought, we might have the opportunity to gather field data over another spring-summer season as it is possible the permitting process could take longer than anticipated. If this is the case we should be ready to take advantage of an opportunity to conduct field work during the driest season.

Btw, is there any reason EPA has not been invited to participate in the meetings to discuss flow studies? I see there was a doodle-poll notification that we were not sent.

Best,

Rob

https://www.fort.usgs.gov/science-feature/113

From: Simms, Jeffrey [mailto:jsimms@blm.gov]
Sent: Friday, August 22, 2014 11:03 AM
To: Ben Lomeli; Marcia Radke; Leidy, Robert
Cc: Daniel Moore
Subject: Fwd: Rosemont hydro call re: PHABSIM

Ben, Marcia and Rob,

Attached is a recommendation to pursue the IFIM approach to changes in water discharge on habitat changes that affect aquatic species and the aquatic ecosystem in general.
Time to understand the process and then make a choice about pursuing it seems to be the issue. If you have any thought based on your experience with IFIM or models like PHABSIM (physical simulation model) or River 2D. please share them. I think a white paper for the FBIG group would be a good idea.

Rob,
Does EPA use or approve of IFIM in general? Is River 2D state of the art? 2 dimensional models for surface water appear to be rather abundant.

Note: this type of work is now being done for amphibian habitat..!

Cheers

On Fri, Aug 22, 2014 at 10:39 AM, Simms, Jeffrey <jsimms@blm.gov> wrote:

> All,
> just a suggestion. Please read the introduction to Miller 2006 and more if you have time.
> That is a good way to have an informed, productive discussion.....Cuts the need for long-winded explanations of the IFIM process and techniques.
>
> The need for the work is self-evident if you have done any impact-effects for water based resources where dams or other flow altering activities occur. This is the best and accepted tool for the job. A white paper on how this would apply to the indirect and cumulative effects of the Rosemont project would not be difficult. I could do this in 6-8 hours time and it would clarify much with the least staff time expended. If Nick had time to participate the quality of such an exercise would be improved as I'm not as current on techniques and new model packages.
>
> I hesitate to be on the call because it seems to me we are getting ahead of ourselves if folks have not read Miller 2006 or the Cherry Creek report, but will participate nonetheless.
>
> Cheer
>
> On Thu, Aug 21, 2014 at 8:24 AM, Chris Garrett <cgarrett@swca.com> wrote:
>
>> Hi all –
>>
>> Mindy's email is down this morning so she asked me to send out this information.
>>
>> Based on the results of the Doodle poll so far, we are going to have the PHABSIM call this **Friday, 3:00-4:00 p.m. AZ time** for whoever can join.
>>
>> (b) (6) [redacted]
>>
>> [redacted]
>>
>> The goal of this call will be to identify the questions we need help answering with respect to PHABSIM. After time to consider, I think most of my personal concerns voiced in the meeting (and in the prior briefing paper) about PHABSIM aren't whether it's a good tool to analyze impacts to fish species. Clearly it represents a useful, solid, widely-used tool for aquatic impact analysis. Rather, my concerns are whether it can be successfully applied in this specific situation on Cienega Creek. To that end and to get the conversation rolling, these are the questions that I have:

PHABSIM has generally two parts---the hydraulic modeling to predict the location of water in the channel (wetted perimeter, how deep, velocity, etc) and the fish behavior modeling about how they like those hydraulic conditions.

Hydraulic modeling:

1) Baseflow in this system is consistently less than about 0.2 cfs or ~100 gpm. Can hydraulic modeling be used successfully at these low flows? As it turns out, I don't know that we need to answer the philosophical part of this question. With the micro-scale effects that we've heard are important to these species, we simply HAVE to do some kind of hydraulic modeling whether it's solving an equation on a piece of paper, using PHABSIM, or using HEC-RAS or Flow2D. However, I think a question we still need to ask is whether logistically the hydraulic modeling part of PHABSIM can mathematically handle these small micro-scale changes?

2) What density of cross-sections are needed to run PHABSIM? A little Googling suggests that this is an often-asked question.

Fish response modeling:

1) We need to have response curves for each separate fish species of concern. Do these response curves exist already from prior research?

2) If these response curves DO exist, do they adequately cover the range of flows we're likely to encounter---less than 0.2 cfs?

3) What other inputs are needed for PHABSIM that we may need to collect in the field?

From: Vogel, Mindy S -FS [mailto:msvogel@fs.fed.us]
Sent: Wednesday, August 20, 2014 4:11 PM
To: nparetti@usgs.gov; Shafiqullah, Salek -FS; Chris Garrett; Jeffrey Simms (jsimms@blm.gov); jason_douglas@fws.gov
Cc: Calhoun, Jean (jean_calhoun@fws.gov); Dennis Sylvia (dsylvia@blm.gov); Melissa Polm
Subject: RE: Rosemont hydro call re: PHABSIM

Just a reminder to this team, please respond to the Doodle below in regards to the meeting Friday. I have heard that USFWS will not be able to call in, but I have not heard from BLM or USGS yet. I will be in the field on Thursday (tomorrow) so was hoping to confirm a meeting time yet today as it's this Friday ☺

Thanks.

Mindy Sue Vogel

From: Vogel, Mindy S -FS
Sent: Tuesday, August 19, 2014 4:43 PM
To: nparetti@usgs.gov; Shafiqullah, Salek -FS; cgarrett@swca.com; Jeffrey Simms (jsimms@blm.gov); jason_douglas@fws.gov
Cc: Calhoun, Jean (jean_calhoun@fws.gov); Dennis Sylvia (dsylvia@blm.gov); mpolm@swca.com
Subject: Rosemont hydro call re: PHABSIM

Hi Team

Following discussions at today's meeting, we are proposing a short call to discuss some general questions related to the basic process and input data necessary for using PHABSIM. No decision has been made to pursue this model, but we need to have a better understand of what the model is, it's uncertainties, the input data required, and how this would be used in the analysis (i.e. will it improve the uncertainty or accuracy?). The general basics for the approach need to be identified so that I can share it with Jim Upchurch to allow him to make a decision.

I have created a doodle pole for 2 different times both this Friday (8/22). Please rsvp asap so that I can finalize the time for everyone to properly plan. Please click on the following link to respond:

(b) (6) [redacted]

Thanks so much for accommodating this into your schedule on relatively short notice.

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Rainfall and Discharge Calibration for Sonoita Creek

Rainfall Analysis

On July 27, 2014 a significant monsoon occurred in the vicinity of the Sonoita Creek project location. ALERT data from the Santa Cruz County Flood Control District were obtained to determine the magnitude of the storm. The ALERT network for the county is shown in Figure 1

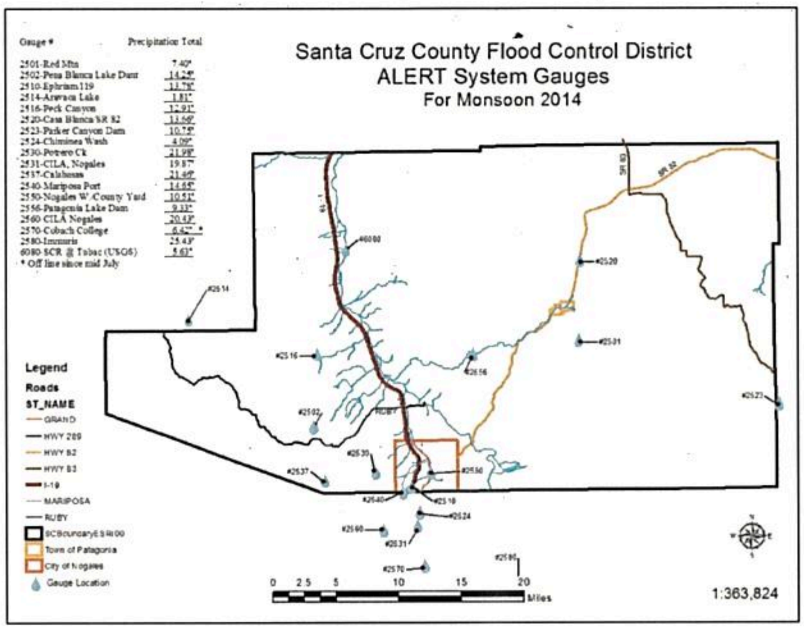

Figure 1. ALERT Network for Santa Cruz County

The ALERT gage closest to the project site is gage #2520, located at Casa Blanca Canyon and Hwy 82. This gage recorded a 24-hr total of 2.76 inches on July 27, 2014. The relevant NOAA Atlas 14 table is shown in Figure 2. Based on the amount of rainfall measured, it is expected that this storm was between a 2-year (2.3") and 5-year (2.86"), 24 hour event.

NOAA Atlas 14, Volume 1, Version 5
Location name: Patagonia, Arizona, US*
Coordinates: 31.6541, -110.7323
Elevation: 4594 ft*
* source: Google Maps

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.339 (0.303-0.382)	0.435 (0.388-0.490)	0.565 (0.502-0.634)	0.660 (0.585-0.740)	0.786 (0.690-0.880)	0.878 (0.765-0.988)	0.972 (0.837-1.10)	1.06 (0.907-1.21)	1.18 (0.988-1.35)	1.27 (1.05-1.48)
10-min	0.516 (0.461-0.582)	0.663 (0.591-0.746)	0.860 (0.764-0.965)	1.00 (0.890-1.13)	1.20 (1.05-1.34)	1.34 (1.16-1.50)	1.48 (1.27-1.67)	1.62 (1.38-1.84)	1.80 (1.50-2.06)	1.94 (1.60-2.25)
15-min	0.640 (0.572-0.721)	0.821 (0.732-0.925)	1.07 (0.947-1.20)	1.25 (1.10-1.40)	1.48 (1.30-1.66)	1.66 (1.44-1.86)	1.83 (1.58-2.07)	2.01 (1.71-2.27)	2.23 (1.86-2.56)	2.40 (1.98-2.79)
30-min	0.861 (0.770-0.972)	1.11 (0.986-1.25)	1.44 (1.27-1.61)	1.68 (1.49-1.88)	2.00 (1.75-2.24)	2.23 (1.94-2.51)	2.47 (2.13-2.79)	2.70 (2.30-3.06)	3.00 (2.51-3.44)	3.24 (2.66-3.75)
60-min	1.07 (0.953-1.20)	1.37 (1.22-1.54)	1.78 (1.58-1.99)	2.08 (1.84-2.33)	2.47 (2.17-2.77)	2.76 (2.41-3.11)	3.06 (2.63-3.45)	3.34 (2.85-3.79)	3.71 (3.11-4.26)	4.01 (3.30-4.65)
2-hr	1.18 (1.06-1.32)	1.50 (1.35-1.69)	1.93 (1.72-2.16)	2.26 (2.00-2.52)	2.71 (2.39-3.03)	3.06 (2.67-3.42)	3.42 (2.95-3.85)	3.78 (3.22-4.28)	4.27 (3.56-4.88)	4.66 (3.82-5.37)
3-hr	1.24 (1.11-1.38)	1.55 (1.40-1.74)	1.97 (1.77-2.20)	2.30 (2.06-2.57)	2.77 (2.46-3.09)	3.13 (2.75-3.50)	3.52 (3.04-3.95)	3.91 (3.33-4.42)	4.45 (3.70-5.09)	4.88 (3.97-5.65)
6-hr	1.42 (1.27-1.60)	1.77 (1.59-2.00)	2.23 (1.98-2.50)	2.60 (2.31-2.92)	3.13 (2.75-3.52)	3.56 (3.08-4.01)	4.01 (3.42-4.54)	4.47 (3.76-5.10)	5.11 (4.19-5.89)	5.63 (4.52-6.56)
12-hr	1.66 (1.50-1.85)	2.08 (1.87-2.32)	2.59 (2.31-2.89)	3.01 (2.68-3.35)	3.60 (3.17-4.00)	4.06 (3.55-4.54)	4.55 (3.92-5.12)	5.06 (4.29-5.73)	5.75 (4.77-6.59)	6.30 (5.12-7.29)
24-hr	1.85 (1.67-2.03)	2.30 (2.09-2.54)	2.86 (2.59-3.15)	3.30 (2.98-3.64)	3.91 (3.51-4.31)	4.37 (3.91-4.82)	4.85 (4.32-5.35)	5.33 (4.72-5.89)	5.98 (5.25-6.63)	6.48 (5.65-7.37)
2-day	2.04 (1.86-2.25)	2.54 (2.31-2.80)	3.14 (2.85-3.46)	3.64 (3.30-4.01)	4.34 (3.92-4.78)	4.89 (4.39-5.39)	5.47 (4.88-6.03)	6.07 (5.37-6.71)	6.89 (6.03-7.67)	7.55 (6.54-8.44)
3-day	2.22 (2.02-2.45)	2.77 (2.52-3.06)	3.43 (3.12-3.79)	3.98 (3.61-4.39)	4.76 (4.29-5.24)	5.37 (4.82-5.92)	6.02 (5.36-6.65)	6.70 (5.92-7.41)	7.63 (6.66-8.49)	8.38 (7.23-9.36)
4-day	2.41 (2.19-2.66)	3.00 (2.73-3.31)	3.72 (3.39-4.11)	4.33 (3.92-4.77)	5.18 (4.67-5.71)	5.86 (5.25-6.46)	6.58 (5.85-7.26)	7.33 (6.46-8.11)	8.37 (7.29-9.31)	9.20 (7.93-10.3)
7-day	2.90 (2.64-3.20)	3.62 (3.29-3.99)	4.51 (4.10-4.98)	5.23 (4.74-5.77)	6.22 (5.62-6.87)	7.00 (6.29-7.73)	7.81 (6.97-8.64)	8.63 (7.66-9.58)	9.77 (8.56-10.9)	10.7 (9.25-11.9)
10-day	3.37 (3.08-3.70)	4.21 (3.85-4.62)	5.21 (4.75-5.72)	6.00 (5.47-6.58)	7.06 (6.41-7.75)	7.87 (7.11-8.64)	8.70 (7.81-9.58)	9.53 (8.50-10.5)	10.6 (9.39-11.8)	11.5 (10.1-12.8)
20-day	4.66 (4.28-5.08)	5.82 (5.35-6.35)	7.14 (6.55-7.79)	8.14 (7.46-8.87)	9.43 (8.61-10.3)	10.4 (9.44-11.3)	11.3 (10.2-12.3)	12.2 (11.0-13.4)	13.4 (12.0-14.7)	14.2 (12.7-15.7)
30-day	5.88 (5.41-6.39)	7.33 (6.75-7.97)	8.93 (8.20-9.70)	10.1 (9.27-11.0)	11.6 (10.6-12.6)	12.6 (11.5-13.7)	13.6 (12.4-14.9)	14.6 (13.3-15.9)	15.8 (14.3-17.3)	16.7 (15.0-18.3)
45-day	7.27 (6.70-7.88)	9.05 (8.33-9.82)	10.9 (10.0-11.8)	12.2 (11.2-13.3)	13.9 (12.7-15.1)	15.0 (13.7-16.3)	16.1 (14.7-17.6)	17.1 (15.6-18.7)	18.4 (16.6-20.1)	19.3 (17.3-21.2)
60-day	8.51 (7.84-9.21)	10.6 (9.75-11.5)	12.7 (11.7-13.8)	14.2 (13.1-15.4)	16.1 (14.7-17.4)	17.3 (15.9-18.8)	18.5 (16.9-20.1)	19.6 (17.9-21.4)	21.0 (19.0-22.9)	21.9 (19.8-24.0)

Figure 2. NOAA Atlas 14 Point Precipitation Data

Discharge Analysis

A site visit was conducted in January to assess field conditions and evaluate hydraulic effects of the 2014 monsoon season. During this visit, a road crossing and structural control was found on the south side of the project location. Fortunately, this location was within the extents of the hydraulic model developed in HEC-RAS for the Sonoita Creek Project. Figure 3 shows the HEC-RAS model schematic and the location of the road crossing.

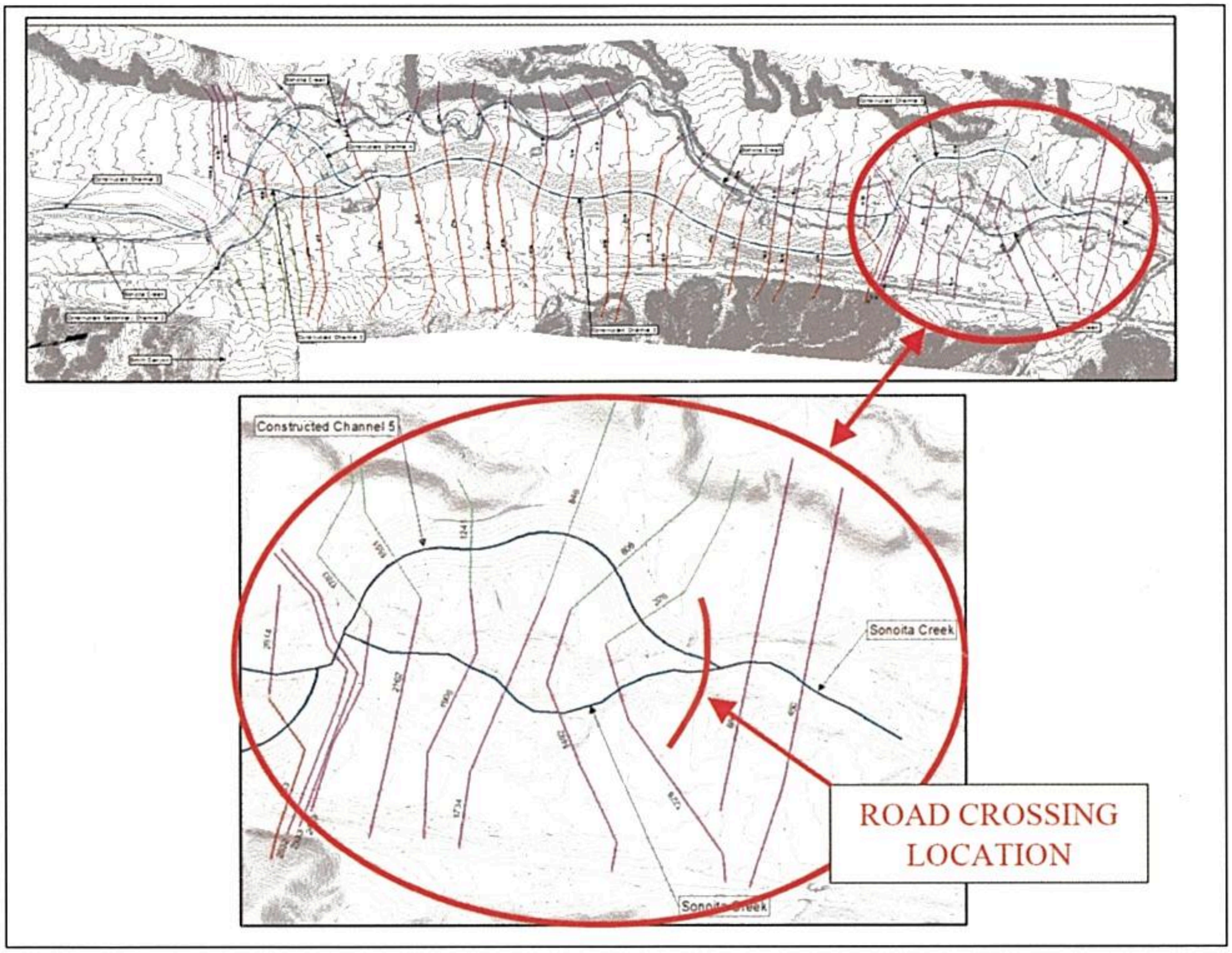

Figure 3. Road Crossing Location

Figure 4 and Figure 5 are photos from the site visit that show the road crossing. It is estimated from the photos that the concrete crossing is approximately 15 ft wide. On the downstream side of the crossing there is an approximate 1-foot immediate drop off to the earthen channel. High water marks are clearly seen in the photo (Figure 5). Maximum water depth in the cross-section reached approximately 2-ft. The concrete crossing was slightly shallower on one side than the other. Looking down stream, the left side of the cross section has slightly more depth and resulted in a higher water surface elevation than on the right side. The right side watermark showed a depth a little greater than 1-foot.

Figure 4. Road Crossing (Photo 1)

Figure 5. Road Crossing (Photo 2) with High Water Markers

For computational simplicity, a smaller HEC-RAS model was run at the southern end of the site in which the road crossing was added. Three cross sections were added to represent the road crossing. The crossing was defined by an entrance section, exit section and drop off section. Manning's n were adjusted for the concrete crossing to 0.020. The remaining channel sections were modeled with a Manning's n value of 0.035 as previously recorded. Based on field observations, it was determined that this section would be better suited to be modeled with a mixed flow regime instead of a sub-critical regime. Discharge estimates for the July storm were made using the same methods for the original study which included taking the point precipitation value of 2.76 and applying an aerial reduction factor of 0.747 to get a value of 2.06 inches. The adjusted rainfall was modeled in SEDCAD to determine the associated discharge. The predicted discharge through the section from the July storm rainfall was 3667.02 cfs. The 2-yr, 5-yr and July Storm water surface elevations were plotted in a profile view (Figure 6). Note that the 2-yr discharge modeled was 2,346 cfs and the 5-yr discharge modeled was 4004 cfs.

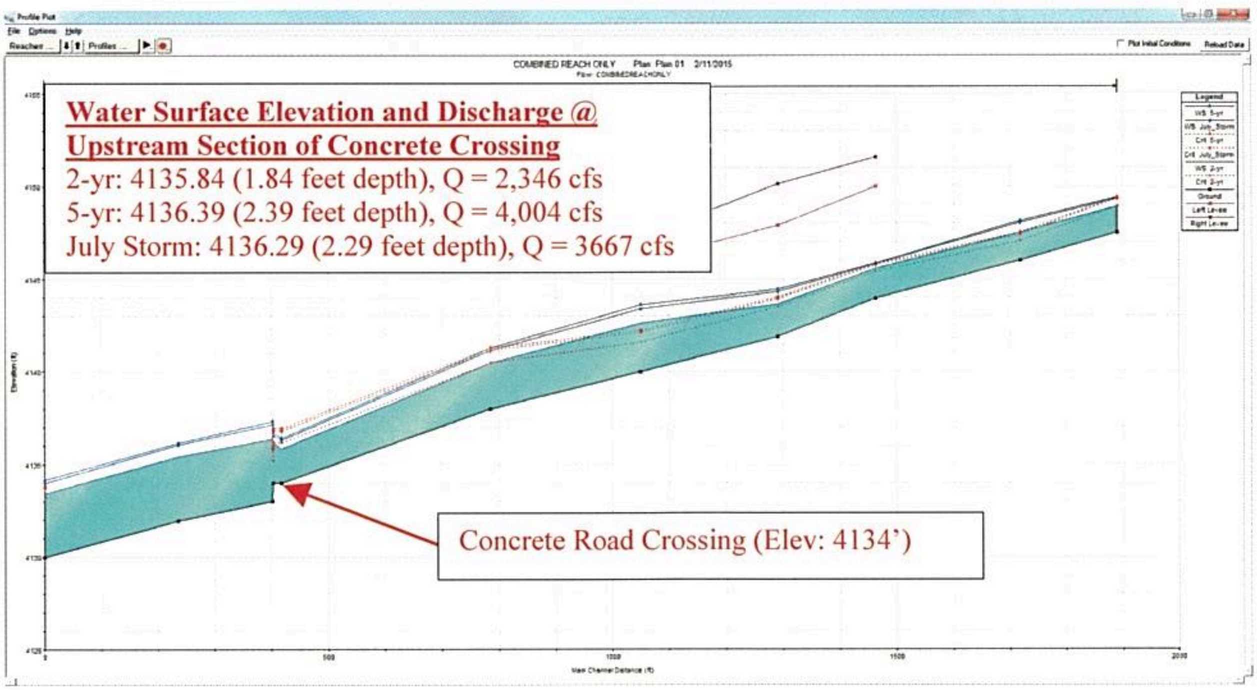

Figure 6. Profile Plot for 2-yr, 5-yr and July Storm

From Figure 6 it can be seen that the depths of flow for the modeled events correspond closely with the high water marks observed in the field. Since there is close correlation between the model and field observations in both rainfall, discharge and approximate water surface elevations, there is confidence in saying that the HEC-RAS model is reflecting field conditions and that the July storm was indeed between a 2-yr and 5-yr event.